IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	)	Patent Pending
Guido et al.	)	
	)	Examiner: Henry Orr
Serial No.: **10/814,551**	)	
	)	Group Art Unit: 2176
Filed: **March 31, 2004**	)	
	)	Confirmation No.: 7434
For: **Affinity Group Window Management**	)	
System and Method	)	
	)	
Attorney's Docket No: **4541-016**		

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APPEAL BRIEF

(I.) REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation.

II.) RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences, to Applicants' knowledge.

(III.) STATUS OF CLAIMS

Claims 1-28 are pending. All claims are rejected.

(IV.) STATUS OF AMENDMENTS

All amendments have been entered.

(V.) SUMMARY OF CLAIMED SUBJECT MATTER

A Graphical User Interface (GUI) is a well-known paradigm for a man-machine interface. Perhaps the best-known example of a GUI is the WINDOWS® operating system. (¶¶ 002, 0013) In such a GUI, different and independent applications appear to execute concurrently, with each application confined to a separate window. The windows may be manipulated within the GUI; for example, a window may be minimized to remove it from the major portion of the GUI (*e.g.*, the "desktop"), or maximized to occupy essentially all of the available display space. In between these extremes, a window may generally assume any size or rectangular shape. Separate windows – whether containing different and independent applications, or related aspects of the same application (such as a menu, toolbar, or the like) – may coexist in the GUI. In this case, the concept of so-called "z-ordering" controls which window(s) appears to overlie other windows, obscuring part or all of the underlying windows. A window assumes the highest z-order (that is, it is displayed on the top) upon being selected, such as with a mouse click. Some applications generate multiple windows, all of which may change of their z-order in the GUI simultaneously. (¶¶ 003, 0015) Some applications may spawn other applications in new windows, and the z-order of the parent and child windows may change together. However, there is no means in the prior art for a user to associate different, independent

applications running in different windows, such that the associated windows subsequently

change their z-order together (¶ 0016).

Claim 1 recites a method of associating windows generated by different applications in a

GUI environment into one or more affinity groups by a user and accessing the windows as a

group. The method includes providing a GUI environment including a plurality of windows

(¶ 0014) and establishing, by a user, a first affinity group comprising a subset of two or more, but

less than all, of the plurality of windows in the GUI environment (¶¶ 0017, 0020). The first

affinity group includes windows associated with at least two different, independent applications,

such that the windows comprising said first affinity group are related (¶ 0014). The method

includes raising a z-order of windows in the first affinity group above other windows in the GUI

environment when any one window in said first affinity group is selected (¶¶ 0014, 0016, 0018).

Multiple such affinity groups may be defined. Claim 14 relates to a method of switching

between two or more groups of windows in a GUI environment. The method includes providing

a GUI environment including a plurality of windows (¶ 0014), said windows divided into at least

first and second affinity groups (¶ 0021), each said affinity group comprising two or more but

less than all of said plurality of windows and each said affinity group including at least one

window associated a different, independent application than at least one other window in the

group (¶ 0014). The method includes raising the windows of said first affinity group to a z-order

level above the windows of said second affinity group in said GUI environment in response to

the user selecting a window in said first affinity group (¶ 0022 – the highest z-order overlies all

other windows in the GUI, regardless of their grouping). The method further includes raising the

windows of the second affinity group to a z-order level above the windows of said first affinity

group in said GUI environment in response to the user selecting a window in said second affinity

group (¶ 0022 – the highest z-order overlies all other windows in the GUI, regardless of their grouping).

Claim 19 is directed to a computer system (¶ 0010) including a display device, at least one input device (¶ 0012), and a processor (¶ 0011). The processor is programmed to display a GUI environment including a plurality of windows and a plurality of z-order levels on the display device (¶ 0013). The GUI environment is operative to allow a user to form affinity groups of the windows via the input device. Each affinity group includes windows associated with at least two different, independent applications (¶ 0014). The GUI environment is further operative to allow a user to select one window to receive a GUI environment window focus, such that when a window in an affinity group receives the window focus, all windows within the affinity group rise to one or more z-order levels higher than all windows not within the affinity group (¶¶ 0014, 0016, 0018).

Claim 25 is directed to a computer readable medium (¶ 0011) storing computer-executable process steps for a GUI environment including a plurality of windows and a plurality of z-order levels. The computer-executable process steps cause a computer to perform the steps of displaying the GUI environment on a display device (¶ 0013), and accept, from a user, designation of a first affinity group comprising a subset of two or more but less than all of the plurality of windows in said GUI environment (¶ 0017), the first affinity group including windows associated with at least two different, independent applications, such that the windows comprising the first affinity group are related (¶ 0014). The computer-executable process steps cause the computer to raise a z-order of windows in the first affinity group above other windows in the GUI environment when any one window in the first affinity group is selected (¶¶ 0014, 0016, 0018).

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According to the claimed invention, a user may create one or more affinity groups comprising windows running separate, independent applications, and change the z-order of all windows and the group simultaneously.

(VI.) GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Whether claims 1-5, 10-22, and 25-28 are obvious under 35 U.S.C. § 103 over U.S. Patent No. 5,995,103 to Ashe in combination with U.S. Patent No. 5,920,313 to Diedrichsen *et al.*?

Whether claims 6-9, 23, and 24 are obvious under 35 U.S.C. § 103 over Ashe and Diedrichsen in combination with U.S. Patent No. 5,694,561 to Malamud *et al.*?

(VII.) ARGUMENT

The claims recite grouping *different* and *independent* applications.

Every independent claim recites grouping GUI windows running *different* and *independent* applications, and simultaneously altering the z-order of all windows in the group. As one example, the specification describes, at ¶ 0014, and with reference to Figure 2, a window 40 associated with a word processor application, a window 38 associated with an e-mail client, and a window 36 associated with a web browser. The user may define an affinity group comprising the windows 36, 38, 40. Thereafter, whenever one of the windows 36, 38, 40 is selected, all three windows 36, 38, 40 rise to the top of the GUI desktop (*i.e.*, they overlie, or obscure, all other windows). The applications are *different* in that they are not the same application, and are *independent* in that they are not logically or functionally related. Both limitations are expressly recited in claims 1, 14, 19 and 25, and cannot be ignored.

Claims 1, 14, 19, and 25 stand rejected as being obvious over the combination of Ashe and Diedrichsen. Neither Ashe nor Diedrichsen, separately or in combination, teach or suggest grouping GUI windows associated with *different* and *independent* applications, and simultaneously altering the z-order of all windows in the group with respect to other GUI windows, when one is selected.

<u>Ashe discloses grouping windows associated with the same application.</u>

Ashe discloses a window grouping mechanism for manipulating and displaying groups of windows, all of which are associated with *the same application* program, via a series of linked data structures. "For example, a drawing application may define a document window into which a user 'draws' images as well as floating or palette windows which contain tools, such as pencil, color, etc., for drawing those images." col. 1, lines 48-51. Ashe discloses that a user may select only a subset of the palette windows to rise to the top of the desktop when the document window is selected, rather than all the palette windows the application has spawned, which may clutter the desktop. col. 3, lines 30-37. Ashe fails to teach or suggest an affinity group of GUI windows, and manipulating the z-order of the group, where the windows are associated with at least two *different* applications. Rather, Ashe discloses grouping and z-order manipulating only windows spawned by a single application. Ashe accomplishes this by creating a linked data structure containing an entry for each window the application creates. Ashe includes group identification information in these data entries, indicating the group(s) with which each window is associated. col. 3, lines 37-45.

Ashe does not disclose grouping windows associated with different applications.

In the Background discussion, Ashe introduces the concept of z-ordering by describing window layer priority classes. In particular, a screensaver having a priority class of 2 will always overlie a window having a priority class of 3, such as a word processing application, a spreadsheet application, or the like. Ashe notes that the applications having priority class 3 can overlie each other in z-order. The Examiner conflates this background discussion of z-ordering with a teaching of grouping windows associated with different applications (those having a priority class of 3) for z-ordering. This argument fails for at least two reasons.

First, Ashe discloses that *all* application windows have a priority class of 3 – as opposed to a screen saver having priority class 2 – and that the applications will overlie each other in z-order. This is precisely the problem Applicants' invention solves – the clutter of all applications having the same z-order priority, and hence the need to manually select and raise each desired window to the top. Applicants' invention solves this problem by defining a group of windows, and altering the z-order of all windows in the group together. Ashe does not teach or suggest such a solution, but in fact teaches against it by describing all applications as having the same priority class of 3, wherein all applications will be overlaid in z-order by a screen saver having a priority class of 2. A "group" comprising all application windows in the GUI is a trivial exercise of the concept of grouping. Furthermore, a "group" comprising all application windows in the GUI cannot possibly meet the express limitation of claim 1, "raising a z-order of windows in said first affinity group *above other windows in said GUI environment* when any one window in said first affinity group is selected."

Second, claim 1 expressly recites, "establishing, by a user, a first affinity group comprising *a subset of two or more but less than all* of said plurality of windows in said GUI

environment." A "group" comprising all application windows does not meet the limitation of a group of two or more, but less than all, application windows in a GUI environment.

Ashe teaches user-defined grouping of a subset of windows spawned by, and associated with, a single application, for the purpose of simultaneous z-order manipulation of windows in the group. This does not meet either of the claimed limitations of grouping windows associated with *different* and *independent* applications, as recited in claims 1, 14, 19, and 25. Nor does Ashe's background discussion of z-order teach grouping less than all application windows for z-order manipulation with respect to other GUI windows.

<u>Diedrichsen discloses grouping windows related as parent/child.</u>

Diedrichsen discloses grouping together various child windows – those spawned by an application running in a parent window – together with the parent to form a logical group. col. 5, line 61 – col. 6, line 4. Windows in the group are identified by, *e.g.*, highlighting the parent window in high intensity and the child windows with a reduced intensity. col. 6, lines 17-34. "Thus, in a system according to the present invention, the user can always tell which objects are *related* to the selected window, even if there are more instances of the same application running." col. 6, lines 40-44. By its express language, Diedrichsen does not disclose grouping windows, for simultaneous z-order manipulation, that are associated with *independent* applications – only applications that "are related to the selected window" as parent/child. This is clear by examining the mechanism by which Diedrichsen forms and maintains the groups, which is described with reference to Figs. 7A and 7B.

Fig. 7A depicts the overall process: select an object (710); highlight it (715); and call related objects (720). Fig. 7B depicts the details of step 720. If the selected object is a parent and

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there are one or more child objects associated with it (740), iterate through all child objects (745, 750). On the other hand, if the selected object is a child and there is a parent associated with it (755), access its parent (760) and iterate through the parent's other child objects (765), to highlight (or otherwise mark) the group. Diedrichsen is able to iterate through these parent/child associations by pointers (created when child objects are spawned) that associate them. See Fig. 6, and col. 8, lines 22-33.

> [T]he parent window always knows about any child window it creates, and hence it can call methods on those windows to visually mark them on the display, in order to differentiate the groups of *related* user interface objects on the desktop; particularly, the parent window can call methods on its child windows to change the color of the window as required.

col. 8, lines 34-40 (emphasis added). Diedrichsen discloses no other mechanism for grouping windows. In particular, Diedrichsen discloses no mechanism by which *different* and *independent* applications running in different windows may be associated by a user (or in any other way) to form affinity groups of windows for simultaneous z-order manipulation on a GUI desktop.

<u>Diedrichsen does not disclose grouping independent windows.</u>

The Examiner cites to the Background of Diedrichsen, asserting it discloses grouping applications other than those related as parent/child. The full paragraph states,

> Many applications make use of several user interface objects, typically windows and icons, *that are related logically.* Such objects are often child objects of a main or parent window object. Different applications can also be organized into groups of applications, each of which are *related by function.*

col. 1, lines 60-65 (emphasis added).

By its plain language, this paragraph discloses grouping only applications that are logically or functionally *related.* Applicants' claims recite grouping *independent* applications. Related applications are not independent.

The term "independent" is not defined in Applicants' specification. Accordingly, the term must be interpreted as it would by one of ordinary skill in the art. As indicated by numerous definitions in the <u>MacGraw-Hill Dictionary of Scientific and Technical Terms</u>, 5th Ed., 1994, in the technical arts, "independent" generally denotes "unrelated to," "not dependent on," or "having independent functionality." See, *e.g.*, independent axioms (one cannot be deduced as a theorem from the others); independent equations (no one is satisfied by a solution to the rest); independent events (probability of one occurring does not affect the probability of the other); independent functions (knowledge of values obtained by all but one insufficient to solve remaining one). *See* Exhibit A. One of ordinary skill in the computing arts would interpret "independent" applications to mean applications that are not logically or functionally related.

In the Advisory Action, the Examiner stated, "the Examiner interprets the scope of the term 'independent' to have broader coverage than 'unrelated by function'. For example, . . . when one instance of an application is closed, the other instance of the same application stays open exemplifies multiple 'independent' application instances." This semantic argument misunderstands the disclosure of Diedrichsen with respect to multiple instances of the same application. Diedrichsen discusses this in the Background,

> A drawback of the prior art is that none of the known systems takes into account the scenario when a user is running more than one instance of the same application; in such situation, association of windows belonging to a particular instance of a process is difficult. Actually, the desktop displays several identical windows at the same time, so that the user cannot find out which windows are related to which others. For example, the user would like to use a particular tool related to the window at present selected (active window); such tool produces data that directly affect the content of the active window. If different instances of the same tool are available in the desktop, it is very difficult to find out which is the correct one related to the active window.

col. 2, lines 33- 46.

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Diedrichsen does not remotely suggest grouping together separate (what the Examiner calls independent) instances of the same application, and altering their z-order in the GUI environment together. Indeed, Diedrichsen does not hint at the desirability of doing so. Rather, Diedrichsen describes the problem that exists when separate instances of the same application are running in the GUI, and each has *other* windows associated with it (*e.g.*, one or more child windows, such as "a particular tool" in the passage quoted above). It is difficult to ascertain with which instance of the application (that is, which parent) a given child window is associated.

Having described this problem in the Background, Diedrichsen proceeds in the Description to disclose its solution – grouping parent and child windows together, visually indicating the relationship (such as by highlighting), and altering the z-order of the parent/child group together. For example, in the situation described in the above-quoted passage, a user could click on a tool, and would instantly see which of multiple instances of parent applications the tool was associated with, as the tool's particular parent window would rise to the top of the GUI z-order upon selecting the tool window.

Nothing in Diedrichsen remotely suggests even the desirability of grouping windows associated with different and independent applications for the purpose of simultaneously altering the z-order of all windows in the group. Diedrichsen discloses precisely one type of window grouping – linking a parent window and all of its children – for the purpose of simultaneous z-order manipulation. Diedrichsen discloses precisely one method for implementing such grouping – cycling through a list of pointers associating each child window with its parent window, the pointers being created when each child window is spawned. Diedrichsen offers no suggestion of grouping windows associated with *different* and *independent* applications for z-order manipulation, and contains no teaching of any mechanism for doing so.

The claimed invention is not obvious over Ashe and Diedrichsen.

Neither Ashe nor Diedrichsen, separately or in combination, fairly teach or suggest grouping together two or more, but less than all, windows in a GUI environment, the windows associated with different, independent applications, for simultaneous z-order manipulation of the windows in the group with respect to all other windows in the GUI environment.

Furthermore, neither Ashe nor Diedrichsen provide any guidance in implementing such a feature. Ashe manipulates the z-order of a subset of child windows spawned by a single application via a linked data structure containing an entry for each window the application creates, each entry including group identification information. Ashe, col. 3, lines 37-45. Diedrichsen manipulates the z-order of a parent window and all of its children together, by cycling through pointers created as each child is spawned. Diedrichsen, Fig. 7B. In both cases, information about the windows in the z-order group is readily available, since in both cases, the child windows in the z-order group were spawned by the parent, which tracks them.

In stark contrast, the claims 1, 14, 19 and 25 recite grouping different and independent applications together for simultaneous z-order manipulation. For example, Figure 2 depicts forming an affinity group comprising windows running a word processor, an e-mail client, and a web browser. By design, operating systems carefully isolate different and independent applications' memory space, disk access, input/output processes, and the like. Accordingly, an application running in a window in a GUI operating system has no knowledge of, or access to, any different, independent application also executing in the GUI environment – except, that is, for tools it launches into separate windows (Ashe) or child processes it spawns (Diedrichsen). The prior art teaches utilizing this knowledge of *related* windows to implement simultaneous z-order manipulation. The prior art of record does not even suggest that it is possible to similarly

implement simultaneous z-order manipulation of groups of windows associated with *different* and *independent* applications. That insight flows solely from Applicants' claims.

For at least the reason that the combination of Ashe and Diedrichsen fails to disclose every limitation of claims 1, 14, 19 and 25, the Examiner has failed to establish a *prima facie* case of obviousness, and the § 103 rejections must be reversed. All dependent claims include all limitations of their respective parent claim(s), and thus also define patentable nonobviousness over the art of record.

Malamud does not cure the failure to establish a *prima facie* case of obviousness.
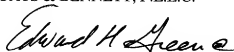
Malamud, cited for implementation details recited in dependent claims 6-9, 23, and 24, discloses a system for grouping windows into a "project group." Once formed, upon receiving a request to close the project group, the current viewing state of each window belonging to the project group is saved, and all windows in the group are closed. Later, upon receiving a request to open the project group, the windows are launched, and the current state of each window in the project group is reset to the saved state. Malamud does not disclose simultaneous z-order manipulation of the project group windows.

Conclusion

For the reasons discussed herein, the § 103 rejections of claims 1, 14, 19, and 24, and all

claims depending therefrom, must be reversed.

Respectfully submitted,

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(VIII.) CLAIMS APPENDIX

1. A method of associating windows generated by different applications in a GUI environment into one or more affinity groups by a user and accessing the windows as a group, comprising:

    providing a GUI environment including a plurality of windows;

    establishing, by a user, a first affinity group comprising a subset of two or more but less than all of said plurality of windows in said GUI environment, said first affinity group including windows associated with at least two different, independent applications, such that the windows comprising said first affinity group are related; and

    raising a z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group is selected.

2. The method of claim 1 wherein raising the z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group is selected comprises raising all windows in said first affinity group to a top level z-order of said GUI environment.

3. The method of claim 2 further comprising tiling the windows in said first affinity group such that said windows may simultaneously occupy the top level z-order of said GUI environment.

4. The method of claim 1 wherein raising the z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group

is selected comprises raising the selected window to a top level z-order of said GUI environment,

and raising all other windows in said first affinity group to one or more z-order levels

immediately below the top level.

5. The method of claim 1 wherein establishing said first affinity group of windows comprises

designating an affinity relationship between existing windows in said GUI by the user.

6. The method of claim 5 wherein designating an affinity relationship between existing windows

by the user comprises:

      selecting a first window;

      dragging said first window to an affinity group icon on a second window; and

      dropping said first window on said affinity group icon of said second window, thereby

            establishing an affinity group relationship between said first and second window.

7. The method of claim 6, further comprising:

      selecting a third window;

      dragging said third window to an affinity group icon on either said first or second

            window; and

      dropping said third window on said affinity group icon of said first or second window,

            thereby adding said third window to said affinity group.

8. The method of claim 5 wherein designating an affinity relationship between existing windows

by the user comprises:

selecting a first window;

executing a first keystroke combination in said first window;

selecting a second window; and

executing a second keystroke combination in said second window, thereby establishing

an affinity group relationship between said first and second window.

9. The method of claim 8, further comprising:

selecting a third window;

executing said first keystroke combination in said third window;

selecting either said first or second window; and

executing said second keystroke combination in said selected first or second window,

thereby adding said third window to said affinity group.

10. The method of claim 1 wherein establishing said first affinity group of windows comprises

creating one or more new windows from an existing window by the user, said existing window

and said new windows having an affinity group relationship.

11. The method of claim 10, wherein creating one or more new windows from an existing

window by the user comprises:

selecting an existing window; and

creating a first new window by executing an affinity group window creation command;

whereby said first new window created has an affinity group relationship with said

existing window.

12. The method of claim 11, further comprising:

    selecting either said existing window or said first new window; and

    creating a second new window by executing an affinity group window creation

        command;

    whereby said second new window created has an affinity group relationship with said

        existing window and said first new window.

13. The method of claim 1 wherein said GUI environment includes virtual desktops.

14. A method of switching between two or more groups of windows in a GUI environment,
comprising:

    providing a GUI environment including a plurality of windows, said windows divided

        into at least first and second affinity groups, each said affinity group comprising

        two or more but less than all of said plurality of windows and each said affinity

        group including at least one window associated a different, independent

        application than at least one other window in the group;

    raising the windows of said first affinity group to a z-order level above the windows of

        said second affinity group in said GUI environment in response to the user

        selecting a window in said first affinity group; and

    raising the windows of the second affinity group to a z-order level above the windows of

        said first affinity group in said GUI environment in response to the user selecting

        a window in said second affinity group.

15. The method of claim 14 wherein said second affinity group comprises all windows in said GUI environment not otherwise included in any affinity group.

16. The method of claim 14 wherein raising a z-order of windows in said first affinity group comprises raising all windows in said first affinity group to the top level z-order of said GUI environment.

17. The method of claim 16 further comprising tiling the windows in said first affinity group such that said windows may simultaneously occupy the top level z-order of said GUI environment.

18. The method of claim 14 wherein raising the z-order of windows in said first affinity group comprises raising the selected window to a top level z-order of said GUI environment, and raising all other windows in said first affinity group to one or more z-order levels immediately below the top level.

19. A computer system, comprising:

    a display device;

    at least one input device; and

    a processor programmed to display a GUI environment including a plurality of windows

        and a plurality of z-order levels on said display device, said GUI environment

        operative to allow a user to form affinity groups of said windows via said input

device, each affinity group including windows associated with at least two different, independent applications, and to select one said window to receive a GUI environment window focus, such that when a window in an affinity group receives said window focus, all windows within said affinity group rise to one or more z-order levels higher than all windows not within said affinity group.

20. The computer system of claim 19 wherein when a window in an affinity group receives said window focus, all windows within said affinity group rise to a highest z-order level of said GUI environment.

21. The computer system of claim 20 wherein all windows within said affinity group are tiled to fit within the highest z-order level of said GUI environment.

22. The computer system of claim 19 wherein when a window in an affinity group receives said window focus, the window receiving said focus rises to a highest z-order level of said GUI environment, and all other windows within said affinity group rise to z-order levels directly below said highest level.

23. The computer system of claim 19 wherein said at least one input device includes a mouse, and wherein said GUI environment is operative to allow a user to form affinity groups of said windows by dragging a first said window and dropping in on a window group icon on a second said window, thereby forming an affinity group relationship between said first and second windows.

24. The computer system of claim 19 wherein said at least one input device includes a keyboard, and wherein said GUI environment is operative to allow a user to form affinity groups of said windows by successively entering one or more window group keystroke combinations into first and second said windows, thereby forming an affinity group relationship between said first and second windows.

25. A computer readable medium which stores computer-executable process steps for a GUI environment including a plurality of windows and a plurality of z-order levels, said computer-executable process steps causing a computer to perform the steps of:

    displaying said GUI environment on a display device;

    accepting, from a user, designation of a first affinity group comprising a subset of two or more but less than all of said plurality of windows in said GUI environment, said first affinity group including windows associated with at least two different, independent applications, such that the windows comprising said first affinity group are related; and

    raising a z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group is selected.

26. The computer readable medium of claim 25 wherein raising the z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group is selected comprises raising all windows in said first affinity group to the top level z-order of said GUI environment.

27. The computer readable medium of claim 26 further comprising tiling the windows in said first affinity group such that said windows may simultaneously occupy the top level z-order of said GUI environment.

28. The computer readable medium of claim 25 wherein raising the z-order of windows in said first affinity group above other windows in said GUI environment when any one window in said first affinity group is selected comprises raising the selected window to a top level z-order of said GUI environment, and raising all other windows in said first affinity group to one or more z-order levels immediately below the top level.

(IX.) EVIDENCE APPENDIX

There is no evidence.

(X.) RELATED PROCEEDINGS APPENDIX

There are no related proceedings.

On the cover: Photomicrograph of crystals of vitamin B₁.
(*Dennis Kunkel, University of Hawaii*)

**McGRAW-HILL DICTIONARY OF SCIENTIFIC AND TECHNICAL TERMS,
Fifth Edition**

cording an irregular flow of data economically and reliably. { ,iŋ·krə'ment·əl 'dij·əd·əl ri'kórd·ər }

incremental dump tape [COMPUT SCI] A safety technique used in time-sharing which consists in copying all files (created or modified by a user during a day) on a magnetic tape; in case of system failure, the file storage can then be reconstructed. Also known as failsafe tape. { ,iŋ·krə'ment·əl 'domp ,tāp }

incremental frequency shift [COMMUN] Method of superimposing incremental intelligence on another intelligence by shifting the center frequency of an oscillator a predetermined amount. { ,iŋ·krə'ment·əl 'frē·kwən·sē ,shift }

incremental hysteresis loss [ELECTROMAG] Hysteresis loss when a magnetic material is subjected to a pulsating magnetizing force. { ,iŋ·krə'ment·əl ,his·tə'rē·səs ,lòs }

incremental induction [ELECTROMAG] The quantity lying between the highest and lowest value of a magnetic induction at a point in a polarized material, when subjected to a small cycle of magnetization. { ,iŋ·krə'ment·əl in'dək·shən }

incremental mode [COMPUT SCI] The plotting of a curve on a cathode-ray tube by illuminating a fixed number of points at a time. { ,iŋ·krə'ment·əl 'mōd }

incremental permeability [ELECTROMAG] The ratio of a small cyclic change in magnetic induction to the corresponding cyclic change in magnetizing force when the average magnetic induction is greater than zero. { ,iŋ·krə'ment·əl ,pərm·ē·ə'bil·əd·ē }

incremental printer [GRAPHICS] A printer, such as a computer-controlled electric typewriter, that prints sequentially, character by character, on each line. { ,iŋ·krə'ment·əl 'print·ər }

incremental representation [COMPUT SCI] A way of representing variables used in incremental computers, in which changes in the variables are represented instead of the values of the variables themselves. { ,iŋ·krə'ment·əl ,rep·rə·zen'tā·shən }

increment borer [FOR] An augerlike instrument with a hollow bit, used to extract thin radial cylinders of wood from trees to determine age and growth rate. { 'iŋ·krə·mənt ,bòr·ər }

incretion [PHYSIO] An internal secretion. { in'krē·shən }

incross [GEN] Mating between individuals from the same inbred line. { 'in,kròs }

incubation [CHEM] Maintenance of chemical mixtures at specified temperatures for varying time periods to study chemical reactions, such as enzyme activity. [MED] The phase of an infectious disease process between infection by the pathogen and appearance of symptoms. [VERT ZOO] The act or process of brooding. { ,iŋ·kyə'bā·shən }

incubation period [MED] The period of time required for the development of symptoms of a disease after infection, or of altered reactivity after exposure to an allergen. [VERT ZOO] The brooding period required to bring an egg to hatching. { ,iŋ·kyə'bā·shən ,pir·ē·əd }

incubator [AGR] A device for the artificial hatching of eggs. [MED] A small chamber with controlled oxygen, temperature, and humidity for newborn infants requiring special care. [MICROBIO] A laboratory cabinet with controlled temperature for the cultivation of bacteria, or for facilitating biologic tests. { 'iŋ·kyə,bād·ər }

incubator oil [MATER] Special grade of long-burning petroleum heating oil used to heat farm incubators. { 'iŋ·kyə,bād·ər ,òil }

incubatory carrier [MED] A person infected with a certain microorganism but in such an early stage of disease that clinical manifestations are not apparent. { 'iŋ·kyə·bə,tòr·ē ,kar·ē·ər }

incubous [BOT] The juxtaposition of leaves such that the anterior margins of older leaves overlap the posterior margins of younger leaves. { 'iŋ·kyə·bəs }

incudate [BIOL] Of, pertaining to, or having an incus. { 'iŋ·kyə,dāt }

incumbent [BIOL] Lying on or down. [GEOL] Lying above, said of a stratum that is superimposed or overlies another stratum. { in'kəm·bənt }

incunabula printing See cradle printing. { ,in·kyə'nab·yə·lə 'print·iŋ }

incurrent canal [INV ZOO] A canal through which water enters a sponge. { in'kər·ənt kə'nal }

incurrent siphon See inhalant siphon. { in'kər·ənt 'sī·fən }

Incurvariidae [INV ZOO] A family of lepidopteran insects in

the superfamily Incurvarioidea; includes yucca moths and relatives. { ,in,kər·və'rī·ə,dē }

Incurvarioidea [INV ZOO] A monofamilial superfamily of lepidopteran insects in the suborder Heteroneura having wings covered with microscopic spines, a single genital opening in the female, and venation that is almost complete. { ,in·kər,var·ē'òid·ē·ə }

incus [ANAT] The middle one of three ossicles in the middle ear. Also known as anvil. [METEOROL] A supplementary cloud feature peculiar to cumulonimbus capillatus; the spreading of the upper portion of cumulonimbus when this part takes the form of an anvil with a fibrous or smooth aspect. Also known as anvil; thunderhead. { 'iŋ·kəs }

indamine [ORG CHEM] HN:C₆H₄:N·C₆H₄NH₂ An unstable dye obtained by the reaction of *para*-phenylenediamine and aniline. Also known as phenylene blue. { 'in·də,mēn }

Indan [ORG CHEM] C₆H₄(CH₂)₃ Colorless liquid boiling at 177°C; soluble in alcohol and ether, insoluble in water; derived from coal tar. { 'in,dan }

indanthrone [ORG CHEM] C₂₈H₁₄N₂O₄ A blue pigment or vat dye soluble in dilute base solutions; used in cotton dyeing and as a pigment in paints and enamels. { in'dan,thrōn }

indeciduate placenta [EMBRYO] A placenta having the maternal and fetal elements associated but not fused. { ,in·də'sij·ə·wət pla'sent·ə }

indefinite ceiling [METEOROL] After United States weather observing practice, the ceiling classification applied when the reported ceiling value represents the vertical visibility upward into surface-based, atmospheric phenomena (except precipitation), such as fog, blowing snow, and all of the lithometeors. Formerly known as ragged ceiling. { in'def·ə·nət 'sēl·iŋ }

indefinite integral [MATH] An indefinite integral of a function f(x) is a function F(x) whose derivative equals f(x). Also known as antiderivative; integral. { in'def·ə·nət 'int·ə·grəl }

indehiscent [BOT] 1. Remaining closed at maturity, as certain fruits. 2. Not splitting along regular lines. { ,in·də'his·ənt }

indelible ink [MATER] An ink that cannot be removed, for example, India ink. { in'del·ə·bəl 'iŋk }

indene [ORG CHEM] C₉H₈ A colorless, liquid, polynuclear hydrocarbon; boils at 181°C and freezes at −2°C; derived from coal tar distillates; copolymers with benzofuran have been manufactured on a small scale for use in coatings and floor coverings. { 'in,dēn }

indent [SCI TECH] To form a depression by forcing inward. { in'dent }

indentation hardness [MET] The resistance of a metal surface to indention when subjected to pressure by a hard pointed or rounded tool. Also known as penetration hardness. { ,in,den'tā·shən 'hard·nəs }

indented bolt [DES ENG] A type of anchor bolt that has indentations to hold better in cemented grout. { in'dent·əd 'bòlt }

independent assortment [GEN] The random assortment of the alleles at two or more loci on different chromosome pairs or far apart on the same chromosome pair which occurs at meiosis; first discovered by G. Mendel. { ,in·də'pen·dənt ə'sòrt·mənt }

independent axioms [MATH] A list of axioms such that no axiom can be deduced as a theorem from the others. { ,in·də'pen·dənt 'ak·sē·əmz }

independent chuck [DES ENG] A chuck for holding work by means of four jaws, each of which is moved independently of the others. { ,in·də'pen·dənt 'chək }

independent contractor [ENG] One who exercises independent control over the mode and means of production to produce the results demanded by the contract. { ,in·də'pen·dənt 'kän,trak·tər }

independent equations [MATH] A system of equations such that no one of them is necessarily satisfied by a solution to the rest. { ,in·də'pen·dənt i'kwā·zhənz }

independent events [STAT] Two events in probability such that the occurrence of one of them does not affect the probability of the occurrence of the other. { ,in·də'pen·dənt i'vens }

independent footing [CIV ENG] A footing that supports a concentrated load, such as a single column. { ,in·də'pen·dənt 'fùd·iŋ }

independent functions [MATH] A set of functions such that knowledge of the values obtained by all but one of them at a point is insufficient to determine the value of the remaining function. { ,in·də'pen·dənt 'fəŋk·shənz }

independent line of sighting [ORD] A system for laying a

: includes yucca moths and rel-

A monofamilial superfamily of border Heteroneura having wings nes, a single genital opening in the almost complete.   { ‚in·kər‚var·

one of three ossicles in the middle [METEOROL] A supplementary ·ulonimbus capillatus; the spread- ·imulonimbus when this part takes fibrous or smooth aspect. Also ·k   { ′in·kəs }

l·C₆H₄N·C₆H₄NH₂ An unstable n of *para*-phenylenediamine and ·ylene blue. { ′in·də‚mēn }
CH₂). Colorless liquid boiling at l ether, insoluble in water; derived

C₂₉H₁₄N₂O₄ A blue pigment or e solutions; used in cotton dyeing d enamels. { in′dan‚thrōn }
·RYO] A placenta having the ma- ·ociated but not fused. { in·də′sij·

·OL] After United States weather ·ng classification applied when the ·ists the vertical visibility upward ·ence phenomena (except precipita- ·snow, and all of the lithometeors. ·eiling. { in′def·ə·nət ′sēl·iŋ }

An indefinite integral of a function ·lerivative equals *f(x)*. Also known ·   { in′def·ə·nət ′in·tə·grəl }

·aining closed at maturity, as certain ·ə regular litres. { ‚in·də′his·ənt }

·a ink that cannot be removed, for ·l·ə·bəl ′iŋk }

·A colorless, liquid, polynuclear ·and freezes at −2°C; derived from ·ırs with benzofuran less been man- ·use in coatings and floor coverings.

·m depression by forcing inward.

·IT] The resistance of a metal sur- ·ected to pressure by a hard pointed ·known as penetration hardness.

·A type of anchor bolt that has in- ·emented grout. { in′den·təd ′bôlt }
·[GEN] The random assortment of ·ci on different chromosome pairs or ·osome pair which occurs at meiosis; ·lel; { ‚in·də′pen·dənt ə′sort·mənt }
·TH] A list of axioms such that no ·a theorem from the others. { ‚in·

·ENG] A chuck for holding work by ·f which is moved independently of ·nə′chak }
·[ENG] One who exercises inde- ·node and method of operations to ·ded by the contract. { ‚in·də′pen·

·MATH] A system of equations such ·cessarily satisfied by a solution to the ·wā·zhənz }
·T] Two events in probability such ·f them does not affect the probability ·e. { ‚in·də′pen·dənt i′vens }
·V ENG] A footing that supports a ·a single column. { ‚in·də′pen·dənt

·MATH] A set of functions such that ·obtained by all but one of them at a ·termine the value of the remaining · { ′faŋk·shənz }
·ing [MATH] A system for laying a

gun, whereby the angle of site and the angle of elevation (range) mechanisms work independently of each other.   { ‚in·də′pen· dant ′[fn əv ′sid·iŋ }
independent migration law [ANALY CHEM] The law that each ion in a conductometric titration contributes a definite amount to the total conductance, irrespective of the nature of the other ions in the electrolyte.   { ‚in·də′pen·dənt mī′grā·shən ‚lo }
independent random variables [STAT] The discrete random variables $X_1, X_2, ..., X_n$ are independent if for arbitrary values $x_1, x_2, ..., x_n$ of the variables the probability that $X_i = x_i$ and $X_j = x_j$, etc., is equal to the product of the probabilities that $X_i = x_i$ for $i = 1, 2, ..., n$; random variables which are unrelated.   { ‚in·də′pen·dənt ′ran‚dam ‚ver·ē·ə·bəls }
independent recoil system [ORD] A recoil mechanism for artillery that has an independent recuperator, that is, the recu- perator is entirely independent of the recoil brake in the recoil mechanism.   { ‚in·də′pen·dənt ′rē‚kóil ‚sis·təm }
independent sector [COMPUT SCI] A device on some punched-card tabulators that allows only the first of a series of similar data items to be printed and prevents printing of the rest.   { ‚in·də′pen·dənt ′sek·tər }
independent-sideband modulation [COMMUN] Modulation in which the radio-frequency carrier is reduced or eliminated and two channels of information are transmitted, one on an upper and one on a lower sideband. Abbreviated ISB modulation.   { ‚in·də′pen·dənt ‚sīd·band ‚mäj·ə′lā·shən }
independent-sideband receiver [ELECTR] A radio receiver designed for the reception of independent-sideband modulation, having provisions for restoring the carrier.   { ‚in·də′pen·dənt ‚sīd‚band ri′sē·vər }
independent-sideband transmitter [ELECTR] A transmitter which produces independent-sideband modulated signals.   { ‚in·də′pen·dənt ‚sīd‚band tranz′mid·ər }
independent suspension [MECH ENG] In automobiles, a system of springs and guide links by which wheels are mounted independently on the chassis.   { ‚in·də′pen·dənt sə′spen·chən }
independent variable [MATH] In an equation $y = f(x)$, the input variable x. Also known as argument.   { ‚in·də′pen·dənt ′ver·ē·ə·bəl }
independent wire-rope core [DES ENG] A core of steel in a wire rope made in accordance with the best practice and design, either hright (uncoated) galvanized or drawn galvanized wire.   { ‚in·də′pen·dənt ′wīr ‚rōp ‚kór }
inderborite [MINERAL] CaMgB₆O₁₁·11H₂O A monoclinic mineral composed of hydrous calcium and magnesium borate.   { ‚in·dər′bó‚rīt }
inderite [MINERAL] Mg₂B₆O₁₁·15H₂O A hydrated borate mineral.   { ′in·də‚rīt }
indeterminacy principle See uncertainty principle.   { ‚in· də′tərm·ə·nə·sē ‚prin·sə·pəl }
indeterminate cleavage [EMBRYO] Cleavage in which all the early cells have the same potencies with respect to development of the entire zygote.   { ‚in·də′tərm·ə·nət ′klē·vij }
indeterminate equations [MATH] A set of equations pos- sessing an infinite number of solutions.   { ‚in·də′tərm·ə·nət i′kwā·zhənz }
indeterminate forms [MATH] Products, quotients, differ- ences, or powers of functions which are undefined when the argument of the function has a certain value, because one or both of the functions are zero or infinite; however, the limit of the product, quotient, and so on as the argument approaches this value is well defined.   { ‚in·də′tərm·ə·nət ′fórmz }
indeterminate growth [BOT] Growth of a plant in which the axis is not limited by development of a reproductive structure, and therefore growth continues indefinitely.   { ‚in·də′tərm·ə· nət ′grōth }
indeterminate truss [CIV ENG] A truss having redundant bars.   { ‚in·də′tərm·ə·nət ′trəs }
index [COMPUT SCI] **1.** A list of record surrogates arranged in order of some attribute expressible in machine-orderable form. **2.** To produce a machine-orderable set of record surrogates, as in indexing a book. **3.** To compute a machine location by indirection, as is done by index registers. **4.** The portion of a computer instruction which indicates what index register (if any) is to be used to modify the address of an instruction.   [MATH] **1.** Unity of a logarithmic scale, as the C scale of a slide rule. **2.** A subscript or superscript used to indicate a specific element of a set or sequence. **3.** The number above and to the left of a

radical sign, indicating the root to be extracted. **4.** For a sub- group of a finite group, the order of the group divided by the order of the subgroup. **5.** For a continuous complex-valued function defined on a closed plane curve, the change in the amplitude of the function when traversing the curve in a coun- terclockwise direction, divided by 2π.   [PHYS] A numerical quantity, usually dimensionless, denoting the magnitude of some physical effect, such as the refractive index.   { ′in‚deks }
index arithmetic unit [COMPUT SCI] A section of some com- puters that performs addition or subtraction operations on ad- dress parts of instructions for the purpose of indexing, boundary tests for memory protection, and so forth.   { ′in‚deks ə′rithmə· tik ‚yü·nət }
index arm [NAV] On a marine sextant, a slender bar carrying the index; the bar pivots at the center of curvature of the arc of the sextant and carries the index and the vernier or micrometer.   { ′in‚deks ‚ärm }
index bed See key bed.   { ′in‚deks ‚bed }
index catalog [ASTRON] A supplement to the New General Catalog of nebulae.   { ′in‚deks ‚kad·əl‚äg }
index center [MECH ENG] One of two machine-tool centers used to hold work and to rotate it by a fixed amount.   { ′in‚deks ‚sen·tər }
index chart [MECH ENG] **1.** A chart used in conjunction with an indexing or dividing head, which correlates the index plate, hole circle, and index crank motion with the desired angular subdivisions. **2.** A chart indicating the arrangement of levers in a machine to obtain desired output speed or fuel rate.   [NAV] In marine operations, an outline chart showing the limits and identifying designations of navigational charts, volumes of sail- ing directions, and so on.   { ′in‚deks ‚chärt }
index counter [ENG] A counter indicating revolutions of the tape supply reel, making it possible to index selections within a reel of tape.   { ′in‚deks ‚kaun·tər }
index crank [MECH ENG] The crank handle of an index head used to turn the spindle.   { ′in‚deks ‚krank }
index cycle [METEOROL] A roughly cyclic variation in the zonal index.   { ′in‚deks ‚sīkəl }
indexed address [COMPUT SCI] An address which is modi- fied, generally by means of index registers, before or during execution of a computer instruction.   { ′in‚dekst ə′dres }
indexed array [COMPUT SCI] An array of data items in which the individual items can be accessed by specifying their position through use of a subscript.   { ′in‚dekst ə′rā }
indexed sequential data set [COMPUT SCI] A collection of related data items that are stored sequentially on a key, but are also accessible through index tables maintained by the system.   { ′in‚dekst si‚kwen·chəl ′dad·ə set }
indexed sequential organization [COMPUT SCI] A sequence of records arranged in collating sequence used with direct-ac- cess devices.   { ′in‚dekst si‚kwen·chəl ‚ór·gə·nə′zā·shən }
index ellipsoid [OPTICS] An ellipsoid whose three perpendic- ular axes are proportional in length to the principal values of the index of refraction of light in an anisotropic medium and point in the direction of the corresponding electric vector. Also known as ellipsoid of wave normals; indicatrix; optical indica- trix; polarizability ellipsoid; reciprocal ellipsoid.   { ′in‚deks ə′lip‚sóid }
index error [ENG] An error caused by the misalignment of the vernier and the graduated circle (arc) of an instrument.   { ′in‚deks ‚er·ər }
index forest [FOR] A forest reaching the highest average in a given locality for density, volume, and increment.   { ′in‚deks ‚fär·əst }
index fossil [PALEON] The ancient remains and traces of an organism that lived during a particular geologic time period and that geologically date the containing rocks.   { ′in‚deks ‚fäs·əl }
index glass See index mirror.   { ′in‚deks ‚glas }
index head [MECH ENG] A headstock that can be affixed to the table of a milling machine, planer, or shaper; work may be mounted on it by a chuck or centers, for indexing.   { ′in‚deks ‚hed }
indexing [MECH ENG] The process of providing discrete spaces, parts, or angles in a workpiece by using an index head.   { ′in‚deks·iŋ }
indexing fixture [MECH ENG] A fixture that changes position with regular steplike movements.   { ′in‚deks·iŋ ‚fiks·chər }
index line See isopleth.   { ′in‚deks ‚līn }
index liquid [OPTICS] A liquid whose index of refraction is